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ABSTRACT

Follow Through Evaluation in Philadelphia has adopted a comprehensive documenting approach, the core of which is an individual pupil file containing coded information indicating length of program exposure (in terms of five or more months per year) for each year of pupil enrollment. A study of the relationships between pupil achievement on the Stanford Early School Achievement Test, Metropolitan Achievement Tests, and Iowa Tests of Basic Skills and pupil length of program exposure seems to indicate growth in achievement as a function of exposure, particularly in two of the seven models used in Philadelphia. (Author)

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SOME ASPECTS OF EXPOSURE-ACHIEVEMENT RELATIONSHIPS IN FOLLOW THROUGH IN PHILADELPHIA

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SOME ASPECTS OF EXPOSURE-ACHIEVEMENT RELATIONSHIPS IN FOLLOW THROUGH IN PHILADELPHIA

Introduction

This paper is a brief, limited report on exposure-achievement relationships in Follow Through in Philadelphia. It had been hoped to present a summary of more comprehensive analyses of these relationships, but a totally unforeseen series of delays in preparing the final, updated form of the individual pupil data file, the source of the analyses, barely allowed time for even the information reported below to be extracted.

Follow Through in Philadelphia consists of seven models in 18 schools, with a total pupil population of approximately 6000 per year since the program became operational across the K-3 range. The seven models are: 1) Bank Street, 2) Behavior Analysis, 3) Bilingual, 4) EDC, 5) Florida Parent, 6) Parent Implemented, and 7) Philadelphia Process.

The Follow Through individual pupil file was constructed in the summer of 1972 in conjunction with responding to a request from the Office of Education for pupil mobility data on the Follow Through population over the first four years of the program, 1968-1972. It had to be developed manually from the study of all available records yielding information on any pupil who had ever been in Follow Through in Philadelphia since the program's inception. The data was then transferred to computer cards formatted essentially according to the record type of the school district's pupil directory system of which the Follow Through file is a subsystem, dependent on the regular updatings of the comprehensive pupil directory to provide current Follow Through pupil information.

The present file is on a computer tape with provision for a 300 character

record for each pupil. Each record contains the following information:

7-digit Philadelphia I D

Name

Birthdate

School

Grade

Room No.

Race

Sex

Follow Through Exposure Codes

Head Start or Equivalent Experience Indicator

1971-72 Grade and City-wide test scores

1972-73 Grade and test scores from Stanford Research Institute (SRI)

Provision for each succeeding year's test scores

Follow Through exposure codes are two-digit indicators for each year; the first digit is a model code or non-Follow Through but Philadelphia school system code, or an out-of-system code; the second digit is a months of exposure index (5 months is accepted as a minimum requirement). City-wide test data are intended to be the regular standardized achievement test information included in the file. In the Spring of 1972, the city-wide battery consisted of: 1) the Stanford Early School Achievement Test in K, 2) the Metropolitan Achievement Test, Primary I in first grade, 3) the Metropolitan Achievement Test, Primary II in second grade, and 4) the Iowa Tests of Basic Skills, Form A, in third grade. City-wide testing was suspended in the Spring of 1973 due to the strike interruptions that school year, but Metropolitan Achievement Test (MAT) scores were provided by Stanford Research Institute (SRI)

for all four grades from the Spring test administration of the national Follow Through evaluation effort.

The above mentioned delays in arriving at a final form of the file which would be current through the Spring of 1973 revolved principally around: 1) securing ID's for the approximately 1000 pupils for whom they were not available at the time of the original file construction, 2) manually updating most of the file for the 1972-73 school year because that year's dual strike period interfered with regular pupil directory updates, and more information than its two data points yielded was necessary for coding pupil Follow Through exposure, 3) manually searching out pupil ID's for approximately half of the SRI test records, where a name-birthdate matching program was unsuccessful in retrieving the ID from pupil directory files, and 4) subsequent problems in obtaining programming and computer time.

The entire Follow Through pupil file contains information on 10,693 pupils who are currently, or were at one time enrolled for at least five months in Follow Through in Philadelphia. The information below is based on the records of 2386 of those pupils, those who took the MAT in first grade in 1972 and the MAT in second grade in 1973, and those who were administered the MAT in second grade in 1972 and again in third grade in 1973. Only six of the seven models had two years of successive testing.

Analysis of gain information is unfortunately not available for this report. What is presented below is a series of tables depicting comparisons of pupil performance on the MAT Total Reading score by grade between sets of exposure groupings in terms of the standard error of measurement of the difference between means.

Exposure-Achievement Comparisons

Tables 1-4 offer four separate analyses of exposure-achievement relationships in the Follow Through program in Philadelphia. Comparisons are made by grade and year in grade between groups having maximum possible exposure for that grade with the group having one year less exposure. (Groups having still less exposure than one year below maximum have such small N's that comparisons were not considered justifiable.) The comparison methodology adopted was a two stage analysis, as found in Davis (Davis, F.B. Educational Measurements and Their Interpretation, Belmont, Calif.: Wadsworth Publishing Co., 1964). Initially, in Tables 1-4 exposure categories are compared in terms of the standard error of measurement of the difference between means to determine the significance of the difference between the obtained scores as estimates of true scores, using the formula:

$$S_{meas}\ (\bar{X}_1 - \bar{X}_2) = S_{meas}\ X \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}$$

(S_{meas} X, the standard error of measurement of an obtained score of any individual on the test was taken from the MAT manual; for Total Reading the figure is 1.8 for the MAT Primary I; 1.9 for MAT Primary II; and 2.5 for the MAT Elementary.) This stage is followed by a t-test to determine whether the difference between the means is only attributable to a chance deviation from a true difference of zero in the particular groups tested. The T-test computation was derived from the formula:

$$t_n = \frac{\bar{X}_1 - \bar{X}_2}{S_{meas}\ (\bar{X}_1 - \bar{X}_2)}$$

where $n = N_1 + N_2 - 2$. It was decided that this procedure was more directly useful for highlighting model differences than performing an analysis of variance.

Table 1. Total Reading, MAT Primary I, First Grade, Spring, 1972: Comparison of Pupils Having ½ -1 Year of Program Exposure with those Having 1½ - 2 Years Exposure in terms of the Standard Error of Measurement of the Difference Between Means.

MODELS AND TOTAL PROGRAM	½ - 1 Year EXPOSURE		1½ - 2 Years EXPOSURE		$S_{meas}(\bar{X}_1 - \bar{X}_2)$	$\bar{X}_1 - \bar{X}_2$	$2.58\ S_{meas}(\bar{X}_1 - \bar{X}_2)$	P(t)
	N_2	$\bar{X}_2$	N_1	$\bar{X}_1$				
1	30	33.67	63	34.86	.3996	1.19	1.031	< .01
2	53	34.81	163	40.40	.2844	5.59	.7338	< .01
3	51	33.18	81	36.74	.3222	3.56	.8313	< .01
4	51	32.86	77	34.83	.3258	1.97	.8406	< .01
5	15	32.53	53	34.85	.5256	2.32	1.356	< .01
7	49	34.18	105	37.97	.3114	3.39	.8034	< .01
Total Program	249	33.68	542	37.33	.1377	3.65	.355	< .01

Table 2. Total Reading, MAT Primary II, Second Grade, Spring, 1972: Comparison of Pupils Having 1½ - 2 Years of Program Exposure with those Having 2½ - 3 Years 'Exposure in terms of the Standard Error of Measurement of the Difference Between Means. (*indicates difference in mean obtained score is not significant at the 1 -percent level).

MODELS AND TOTAL PROGRAM	1½ - 2 Years EXPOSURE		2½ - 3 Years EXPOSURE		$S_{mean}(\bar{X}_1 - \bar{X}_2)$	$\bar{X}_1 - \bar{X}_2$	$2.58\ S_{mean}(\bar{X}_1 - \bar{X}_2)$	P(t)
	N 2	$\bar{X}$ 2	N 1	$\bar{X}$ 1				
1	39	41.03	65	46.25	.3848	5.22	.933	<.01
2	47	46.36	120	47.33	.3268	.97	.8431	<.01
3	48	45.63	56	46.25	.3737	.62	.9642*	NS
4	41	44.46	71	44.51	.3724	.05	.9608*	NS
5	11	41.55	34	43.35	.6591	1.80	1.7005	<.01
7	30	46.40	71	47.32	.4137	.92	1.0674*	<.05
Total Program	216	44.63	417	46.21	.1593	1.58	.4109	.01

Table 3. Total Reading, MAT Primary II, Second Grade, Spring, 1973: Comparison of Pupils Having 1½ - 2 Years of Program Exposure with those Having 2½ - 3 Years 'Exposure in Terms of the Standard Error of Measurement of the Difference Between Means. (*indicates difference in Mean obtained scores is not significant at the 1 - percent level; **indicates mean obtained score of lower exposure group is higher than that of higher exposure group.).

MODELS AND TOTAL PROGRAM	1½ - 2 Years EXPOSURE		2½ - 3 Years EXPOSURE		$S_{meas}(\bar{X}_1 - \bar{X}_2)$	$\bar{X}_1 - \bar{X}_2$	$2.58\ S_{meas}(\bar{X}_1 - \bar{X}_2)$	P(t)
	N_2	$\bar{X}_2$	N_1	$\bar{X}_1$				
1	26	45.08	64	46.69	.4418	1.61	1.140	<.01
2	51	47.63	160	50.37	.3055	2.74	.788	<.01
3	49	47.02	78	45.40	.3463	1.62	.8934**	<.01 **
4	47	44.79	75	45.63	.3534	.84	.9118*	<.05
5	13	43.69	45	44.98	.5983	1.29	1.544 *	<.05
7	42	42.12	101	46.48	.3488	4.36	.900	<.01
Total Program	228	45.38	523	47.28	.1508	1.90	.3891	<.01

Table 4. Total Reading, MAT Elementary, Third Grade, Spring, 1973: Comparison of Pupils Having 2½ - 3 Years of Program Exposure with those Having 3½ - 4 Years 'Exposure in Terms of the Standard Error of Measurement of the Difference Between Means. (* indicates difference in mean obtained scores is not significant at the 1 - percent level; ** indicates mean obtained score of lower exposure group is higher than that of higher exposure group.)

MODELS AND TOTAL PROGRAM	2½ - 3 Years EXPOSURE		3½ - 4 Years EXPOSURE		$S_{meas}(\bar{X}_1 - \bar{X}_2)$	$\bar{X}_1 - \bar{X}_2$	$2.58\ S_{meas}(\bar{X}_1 - \bar{X}_2)$	P(t)
	$\bar{N}_2$	$\bar{X}_2$	$\bar{N}_1$	$\bar{X}_1$				
1	39	42.87	62	50.27	.511	7.40	1.318	<.01
2	49	52.02	121	54.50	.4233	2.48	1.092	<.01
3	49	50.33	56	49.88	.489	.45	1.262*	NS
4	33	46.76	68	49.01	.5304	2.25	1.368	<.01
5	14	41.14	37	47.78	.7844	6.64	2.0238	<.01
7	27	53.89	68	52.09	.5688	1.80	1.467**	<.01 **
Total Program	211	48.63	412	51.33	.2116	2.70	.546	<.01

Regarding the t-test employed, since local evaluation of Follow Through in Philadelphia focuses on the Follow Through population in the city as the population of concern it was felt that this was the more appropriate test rather than one allowing inferences to a larger national population, which seem best left to the national evaluation analysis.

Table 1 compares first grade performance in the Spring of 1972 between maximum exposure and one-year-less-than maximum groups. The higher exposure group in each model and the total program is consistently higher in mean score with indications of significant differences in obtained score as well as significant mean differences for this population.

In Table 2, where comparisons are made between maximum and one-year-less exposure groups among second graders in the Spring of 1972, higher exposure in models 3, 4, and 7 produces considerably less than significant differences at the one-per-cent level in obtained score, and higher exposure in models 3 and 4 likewise does not approach acceptable levels of significance on the t-test.

Second graders in the Spring of 1973 (table 3), essentially those who were first graders in the Spring of 1972 (table 1), when separated into maximum and one-year-less exposure categories, show significant mean differences for the higher exposure group in this population in each model and the total program, except in model 3. Also note that higher exposure in models 4 and 5 does not correspond to differences in obtained score at the one-per-cent level. In model 3 the lower exposure group is significantly higher than the higher exposure group on both counts.

Table 4 shows similar comparisons for third graders in the Spring of 1973 (essentially those same pupils shown as second graders in the Spring of 1972

in table 2). With the exception of models 3 and 7, each model and the total program show significant differences in obtained score and significant population mean differences (this population) favoring the higher exposure group. In model 3 the difference in obtained score is not significant at the one-percent level nor is there an indication at an acceptable level of significance of mean differences in this population. In model 7 both levels of significance favor the lower exposure group.

Within the context of this analysis there seem to be consistent positive relationships between exposure and achievement in reading in models 1, 2, and the total program. The other models are inconsistent in this respect; model 5 is less inconsistent than these others; model 3 is the least consistent. These findings correspond to the higher level of performance in models 1 and 2 which was apparent in cross-sectional analysis of Follow Through-Non Follow Through achievement in Philadelphia on the Spring, 1973 MAT administration.

Table 5 is introduced to further illustrate the performance level of model 2 on the dimension of positive exposure-achievement relationship. As can be seen in tables 1-4, this model alone is consistently higher in mean performance than the total program in the maximum groupings. Davis' (ibid.) procedure for comparing mean performance of two overlapping groups was applied to determine whether there was a significant difference in obtained score favoring the model 2 group over the total program. The data in table 5 confirm that this was the case. The formula used was:

$$S_{meas}\ (\bar{X}_s - \bar{X}_t) = S_{meas} \sqrt{\frac{1}{N_s} - \frac{1}{N_t}}$$

One further indicator of model 2's performance level is illustrated by the following data from a different perspective, that of changes in percentages of pupils scoring below the 16th percentile and above the 50th percentile.

Table 5. Comparison of Model 2 with Total Program Performance Within Each Higher Exposure Category of Tables 1 - 4 in Terms of the Standard Error of Measurement of the Difference Between the Means of Two Overlapping Groups.

HIGHER EXPOSURE CATEGORY	MODEL 2		TOTAL PROGRAM		$S_{meas}(\bar{X}_S - \bar{X}_T)$	$\bar{X}_S - \bar{X}_T$	$2.58\, S_{meas}(\bar{X}_S - \bar{X}_T)$
	N_S	$\bar{X}_S$	N_T	$\bar{X}_T$			
1½ - 2 Yrs. Spring, 1972	163	40.40	542	37.33	.1179	3.07	.3042
2½ - 3 Yrs. Spring, 1972	120	47.33	417	46.21	.1464	1.12	.3777
2½ - 3 Yrs. Spring, 1973	160	50.37	523	47.28	.1252	3.09	.3230
3½ - 4 Yrs. Spring, 1973	121	54.50	412	51.33	.1910	3.17	.4928

on national norms as a function of exposure. Second graders in this model who had 1 ½ - 2 years of exposure in the Spring of 1973 had 42% below the 16th and 36% above the 50th percentile in Total Reading on the MAT; those who had 2½-3 years exposure, on the other hand, had 21% below the 16th and 48% above the 50th percentile. Somewhat similar changes favoring higher exposure are found in third grade performance in this model on the MAT Total Reading Test for the same Spring administration. Those with 2½-3 years exposure had 30% below the 16th and 17% above the 50th; those with 3½-4 years showed 25% below the 16th and 31.5% above the 50th percentile.

Concluding Statement

While these data and analyses are limited in their scope, there does seem to be preliminary evidence of positive exposure-achievement relationships in at least two models, and in the program as a whole, in Follow Through in Philadelphia. This relationship seems most pronounced in one of the models, model 2.